UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/582,394	04/18/2008	Jun Oguma	Q95134	1574

23373 7590 10/06/2011

SUGHRUE MION, PLLC
2100 PENNSYLVANIA AVENUE, N.W.
SUITE 800
WASHINGTON, DC 20037

EXAMINER	
BOHATY, ANDREW K	

ART UNIT	PAPER NUMBER
1786	

NOTIFICATION DATE	DELIVERY MODE
10/06/2011	ELECTRONIC

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Notice of the Office communication was sent electronically on above-indicated "Notification Date" to the following e-mail address(es):

USPTO@sughrue.com
sughrue@sughrue.com
PPROCESSING@SUGHRUE.COM

Office Action Summary	Application No.	Applicant(s)	
	10/582,394	OGUMA ET AL.	
	Examiner	Art Unit	
	ANDREW K. BOHATY	1786	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *15 August 2011*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ An election was made by the applicant in response to a restriction requirement set forth during the interview on _____; the restriction requirement and election have been incorporated into this action.

4)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

5)☒ Claim(s) *1,3-13,15-23,25-40,44,45,48-50,71-75,77-98 and 100-109* is/are pending in the application.

5a) Of the above claim(s) *2,14,24,41-43,46,47,51-70,76 and 99* is/are withdrawn from consideration.

6)☐ Claim(s) _____ is/are allowed.

7)☒ Claim(s) *1,3-13,15-23,25-40,44,45,48-50,71-75,77-98 and 100-109* is/are rejected.

8)☐ Claim(s) _____ is/are objected to.

9)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

10)☐ The specification is objected to by the Examiner.

11)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

12)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

13)☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☒ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☒ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date *See Continuation Sheet*.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____ .
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

Continuation of Attachment(s) 3). Information Disclosure Statement(s) (PTO/SB/08), Paper No(s)/Mail Date :2006/06/12; 2010/03/17; 2010/11/17; 2011/03/07; 2011/05/16; 2011/06/16.

DETAILED ACTION

Election/Restrictions

1. Applicant's election without traverse of Groups I, claims 1-50, 71-98, and 100-108, and species the polymer is a linear copolymer comprising 1 other repeating unit, which is a compound of formula (13), and Rw and Rx do not form a ring in formula (1) in the reply filed on August 15, 2011 is acknowledged. Claims 1,3-13,15-23,25-40,44,45,48-50,71-75,77-98 and 100-109 read on the elected species.

2. Claims 2,14,24,41-43,46,47,51-70,76 and 99 are withdrawn from further consideration pursuant to 37 CFR 1.142(b) as being drawn to a nonelected group and species, there being no allowable generic or linking claim. Election was made **without** traverse in the reply filed on August 15, 2011.

Claim Rejections - 35 USC § 112

3. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

4. Claims 7 and 85 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

5. Regarding claim 7, the phrase "wherein the aromatic hydrocarbon ring has a substituent" is indefinite. It is unclear if the applicant means both rings have a substituent or just one of the rings. The examiner will interpret the claim as just one of the rings needs to be substituted.

6. Regarding claim 85, the phrase "wherein the ratio of a solvent having highest boiling point is 40 to 90 wt%" is indefinite. It is unclear how many solvents are present because in claim 80, which claim 85 depends, this is no indication of how many solvent are present. The examiner will interpret the claim as there are two are more solvents present.

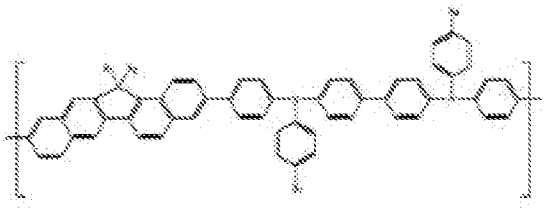
Claim Rejections - 35 USC § 102

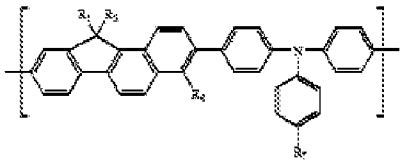
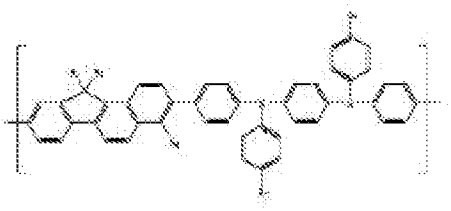
7. The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

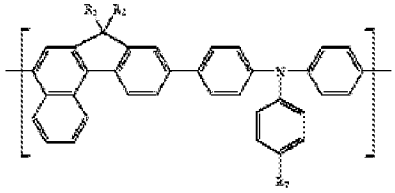
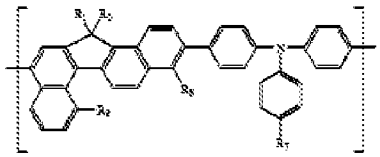
> A person shall be entitled to a patent unless –
>
> (a) the invention was known or used by others in this country, or patented or described in a printed publication in this or a foreign country, before the invention thereof by the applicant for a patent.
>
> (e) the invention was described in (1) an application for patent, published under section 122(b), by another filed in the United States before the invention by the applicant for patent or (2) a patent granted on an application for patent by another filed in the United States before the invention by the applicant for patent, except that an international application filed under the treaty defined in section 351(a) shall have the effects for purposes of this subsection of an application filed in the United States only if the international application designated the United States and was published under Article 21(2) of such treaty in the English language.

8. Claims 1, 3, 4, 7-13, 15-17, 23, 25, 27, 35, 37, 38, 45, 71-74, 77, 78, 80, 81, 83, 86, 88, 91-98, 100, 101, and 105 are rejected under 35 U.S.C. 102(a) and 35 U.S.C. 102(e) as being anticipated by Zheng et al. (US 2004/0131880) (hereafter “Zheng”).

9. Regarding claims 1, 3, 4, 7-13, 15-17, 23, 25, 27, 35, 37, 38, 92, 94, 96, 100, and 101, Zheng teaches polymer light emitting devices where the light emitting layer can

composed of the following polymers,  ,

 ,  ,

 , and  (paragraphs [0084] and [0257]-[0261], compounds 193-195, 203-207, 222-225, 279-282, and 288-291), where the ratio of each repeating unit is 1:1. Zheng teaches the molecular weight of the polymer are above 1000 (paragraph [0086]).

10. Regarding claims 71-74, 77, and 78, Zheng teaches the above polymers can be found in a composition comprising 2 or more of the polymers (paragraph [0022]).

11. Regarding claims 45, 80, 81, 83, and 86, although Zheng does not specifically teach the claimed properties, the polymer inherently has these properties.

12. Regarding claims 88, 90, 93, 95, 97, and 105, although Zheng does not specifically teach the claimed properties, the polymer film inherently has these properties.

13. Regarding claim 98, Zheng teaches the polymer can be used in an organic transistor (paragraph [0102]).

Claim Rejections - 35 USC § 103

14. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

15. The factual inquiries set forth in *Graham* v. *John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

16. Claims 5, 6, 18-22, 28-34, 39, 40, 75, and 79, are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. (US 2004/0131880) (hereafter "Zheng") as applied to claims 1, 3, 4, 7-13, 15-17, 23, 25, 27, 35, 37, 38, 45, 71-74, 77, 78, 80, 81, 83, 86, 88, 91-98, 100, 101, and 105 above.

17. Regarding claims 5 and 6, Zheng does not specifically teach polymers having the molecular weights of greater than $5x10^4$ and 10^5.

18. Zheng does teach that the molecular weight of the polymers needs to be above 2000 and teaches polymer with molecular weights as high as 39000 (paragraph [0086] and Table 1).

19. It would have been obvious to one of ordinary skill in the art to make polymers that meet that applicant's claimed molecular weights. It is well known in the art that higher molecular weight polymers have a higher Tg and can lead to a device with better stability.

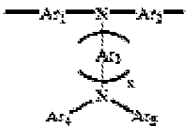
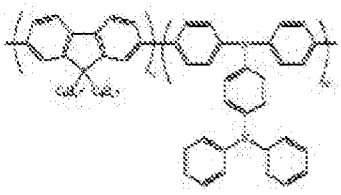
20. Regarding claims 18-22, 28-34, 39, 40, 75, and 79, Zheng does not specifically teach polymers that have the claimed molecular structure, claimed ratio of the different repeating units, or the claimed substitution pattern on the repeating units.

21. Zheng teaches the repeating unit in the polymers can meet applicant's formula (32) or (33) (compound 190). Zheng also teaches that the molar ratio of the different repeating units can be different than 1:1 (compounds 176 and 292). Furthermore, Zheng teaches that that fluorenyl repeating unit can be substituted with branched or cyclic alkyl groups and teaches the substitution can be a variety of different locations (paragraphs [0009]-[0010] and [0021] and compounds (222), (275), (283), (288), and (292)).

22. Given the teachings of Zheng in the specification, it would have been obvious to one of ordinary skill in the art to try to make polymer compounds that meet the applicant's claimed molecular structure, claimed molar ratios of the different repeating units and added the substitution to the fluorenyl groups at the claimed positions. Given that Zheng teaches a variety of different molecular structures for the different repeating

units and the amount of the repeating units can be varied and the substitution on the fluorenyl repeating unit can be in a variety of different locations, it would have been obvious one of ordinary skill in the art to try to make the claimed compounds.

23. Claims 1, 4-8, 23, 25, 27-32, 36, 39, 45, 71, 80, 81, 83, 84, 91-98, and 100-109 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (US 2003/0165713) (hereafter “Oguma") in view of Chen et al. (US 2003/0143422) (hereafter “Chen”).

24. Regarding claims 1, 7, 8, 23, 25, 27-32, 36, 92, 94, 96, 100-102, Oguma teaches a light emitting device comprising in order an anode, an hole injection layer, a hole transporting layer, a light emitting layer, an electron transporting layer, and a cathode (paragraphs [0141]-[0153]). Oguma teaches the light emitting layer can be composed of copolymer with the following repeating units,  and  , where Ar_6 can be a fluorenyl group (paragraphs [0008]-[0010]). Oguma specifically teaches  as a polymer that meets the above formulae (paragraph [0217]). Oguma teaches the fluorenyl group can be substituted and the substituents include alkyl groups, cyclic, branched and linear, and aryl groups (paragraphs [0052] and [0076]-[0078]).

25. Oguma does not teach where the fluorene repeating unit comprises condensed benzene rings instead of benzene rings.

26. Chen teaches that making the benzene groups in fluorene compounds condensed benzene groups one can make a compound that is non-planar (paragraph [0020]). Chen teaches this non-planar structure leads to materials suppressing excimer formation because the pi-orbitals of adjacent emitting molecules cannot interact with one another (paragraph [0020]).

27. It would have been obvious to one of ordinary skill in art at the time the invention was made to modify the fluorene repeating unit in Oguma, so the benzene groups where condensed benzene groups leading to a polymer that is not planar. The motivation would have been to make a polymer that suppresses excimer formation.

28. Regarding claims 4-6, Oguma teaches the polymer styrene molecular weight of the polymers to be 10^3-10^8 and more preferably $2x10^4$-10^5 (paragraph [0114]).

29. Regarding claims 39, given that Oguma and the applicant's synthesize the polymers in the same way (paragraphs [0118] and [0214]), one ordinary skill in the art would expect the polymers would meet the applicant's claimed molecular structure.

30. Regarding claims 71, Oguma teaches the copolymer can be mixed with other polymers or small molecules that are charge transporting or light emitting (paragraphs [0176]-[0179]).

31. Regarding claims 80, 81, 83, 84, Oguma teaches that the light emitting layer comprising the copolymer is used using a wet method, such as spin coating, and in

order to do this the copolymer needs to be in a solution (paragraph [0174]). Oguma teaches the solvent used the make the solution can be xylene (paragraph [0113]).

32. Regarding claims 45, 91, 93, 95, 97, and 105, although Oguma in view of Chen does not specifically teach the claimed properties, these properties naturally flow from the combination.

33. Regarding claim 98, Oguma teaches the polymer can be used for organic transistors (paragraph [0250]).

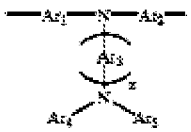
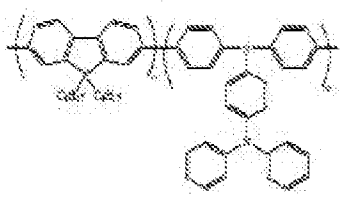
34. Regarding claims 103 and 104, Oguma teaches the polymer can be used as a conductive material if the polymer is doped (paragraph [0116]). Oguma further teaches that polymers that can be used in the hole injection layer and hole transporting layer can comprise aryl amine repeating units (paragraphs [0159] and [0182]).

35. Oguma does not specifically teach the use of the polymers in the hole injection layer or hole transporting layer.

36. Given the teachings of Oguma, it would have been obvious to one of ordinary skill in the art at the time the invention was made to try to use of the polymer of Oguma in view of Chen in the hole injection layer or hole transporting layer of the light emitting device. Given that Oguma teaches if the polymer are doped that can be used as a conductive material and teaches that aryl amine containing polymers can be used in the hole injection layer or hole transporting layer and the polymers or Oguma in view of Chen comprise aryl amines, it would have been obvious for one of ordinary skill in the art to try to use the polymer in the hole injection layer or hole transporting layer.

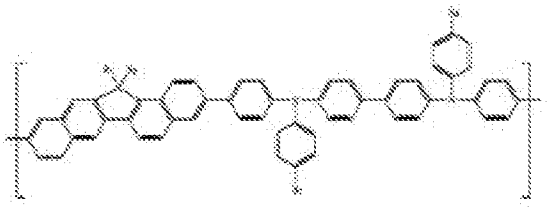
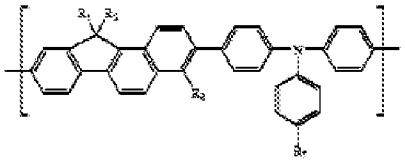
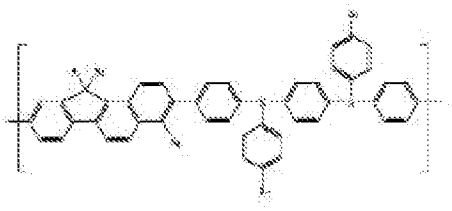
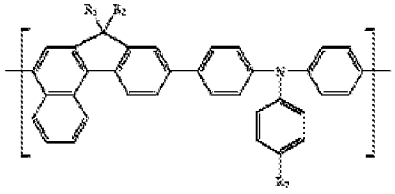
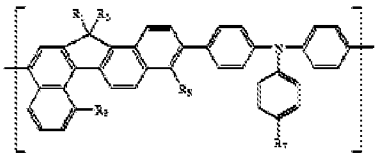
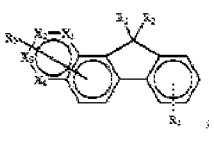
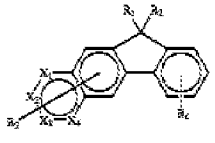
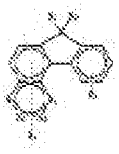
37. Regarding claims 106-109, Oguma teaches the polymer light emitting device can be used in a sheet light source, segment display, dot matrix display, or a back light source in a liquid crystal display (paragraph [0208]).

38. Claims 1, 3-13, 15-23, 25, 27-33, 36, 39, 40, 71, 80, 81, 83, 84, 91-98, and 100-109 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (US 2003/0165713) (hereafter “Oguma") in view of Zheng et al. (US 2004/0131880) (hereafter “Zheng”).

39. Regarding claims 1, 7-13, 15-19, 23, 25, 27-33, 36, 92, 94, 96, 100-102, Oguma teaches a light emitting device comprising in order an anode, an hole injection layer, a hole transporting layer, a light emitting layer, an electron transporting layer, and a cathode (paragraphs [0141]-[0153]). Oguma teaches the light emitting layer can be composed of copolymer with the following repeating units,  and —Ar6— , where Ar_6 can be a fluorenyl group (paragraphs [0008]-[0010]). Oguma specifically teaches  as a polymer that meets the above formulae (paragraph [0217]). Oguma teaches the fluorenyl group can be substituted

and the substituents include alkyl groups, cyclic, branched and linear, and aryl groups (paragraphs [0052] and [0076]-[0078]).

40. Oguma does not teach where the fluorene repeating unit comprises condensed benzene rings instead of benzene rings.

41. Zheng teaches polymer light emitting devices where the light emitting layer can composed of the following polymers,  ,  ,  ,  , and  (paragraphs [0084] and [0257]-[0261], compounds 193-195, 203-207, 222-225, 279-282, and 288-291), where the ratio of each repeating unit is 1:1. Zhen teaches the fluorenyl groups meet the following formulae,  ,  , or  and these repeating units can be further substituted (paragraphs [0009]-[0011]).These polymers

are very similar to the polymers of Oguma expect that Zheng teaches the fluorenyl groups used is different.

42. It would have been obvious to one of ordinary skill in the art at the time the invention was made to substitute the fluorenyl groups of Oguma for the fluorenyl groups taught by Zheng. The substitution would have been one known fluorenyl group for another and would lead to predictable results of using the fluorenyl groups of Zheng in a copolymer comprising an aryl amine repeating unit. Both Oguma and Zhen teach copolymers comprising fluorenyl groups and aryl amine repeating units and both teach the copolymers are used in the light emitting layer of a polymer light emitting device; therefore, the substitution would have been obvious.

43. Regarding claims 4-6, Oguma teaches the polymer styrene molecular weight of the polymers to be 10^3-10^8 and more preferably $2x10^4$-10^5 (paragraph [0114]).

44. Regarding claims 20-22, 39, 40, given that Oguma and the applicant's synthesize the polymers in the same way (paragraphs [0118] and [0214]), one ordinary skill in the art would expect the polymers would meet the applicant's claimed molecular structure.

45. Regarding claims 71, Oguma teaches the copolymer can be mixed with other polymers or small molecules that are charge transporting or light emitting (paragraphs [0176]-[0179]).

46. Regarding claims 80, 81, 83, 84, Oguma teaches that the light emitting layer comprising the copolymer is used using a wet method, such as spin coating, and in order to do this the copolymer needs to be in a solution (paragraph [0174]). Oguma teaches the solvent used the make the solution can be xylene (paragraph [0113]).

47. Regarding claims 45, 93, 95, 97, and 105, although Oguma in view of Chen does not specifically teach the claimed properties, these properties naturally flow from the combination.

48. Regarding claim 98, Oguma teaches the polymer can be used for organic transistors (paragraph [0250]).

49. Regarding claims 103 and 104, Oguma teaches the polymer can be used as a conductive material if the polymer is doped (paragraph [0116]). Oguma further teaches that polymers that can be used in the hole injection layer and hole transporting layer can comprise aryl amine repeating units (paragraphs [0159] and [0182]).

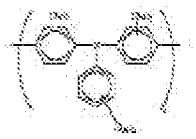
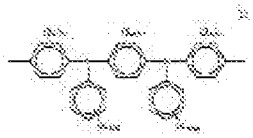
50. Oguma does not specifically teach the use of the polymers in the hole injection layer or hole transporting layer.

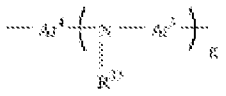
51. Given the teachings of Oguma, it would have been obvious to one of ordinary skill in the art at the time the invention was made to try to use of the polymer of Oguma in view of Zheng in the hole injection layer or hole transporting layer of the light emitting device. Given that Oguma teaches if the polymer are doped that can be used as a conductive material and teaches that aryl amine containing polymers can be used in the hole injection layer or hole transporting layer and the polymers or Oguma in view of Zheng comprise aryl amines, it would have been obvious for one of ordinary skill in the art to try to use the polymer in the hole injection layer or hole transporting layer.

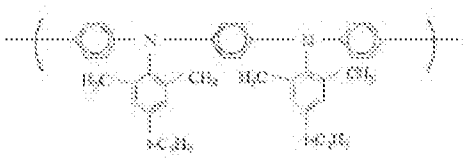
52. Regarding claims 106-109, Oguma teaches the polymer light emitting device can be used in a sheet light source, segment display, dot matrix display, or a back light source in a liquid crystal display (paragraph [0208]).

53. Claims 26, 44, and 87 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. (US 2004/0131880) (hereafter "Zheng") as applied to claims 1, 3-13, 15-23, 25, 27-35, 37-40, 45, 71-75, 77-81, 83, 86, 88, 91-98, 100, 101, and 105 above, and further in view of Noguchi et al. (WO/3099901), where Noguchi et al. (JP2004-051962) (hereafter "Noguchi") is used as the English equivalent.

54. Regarding claims 26, 44, and 87, Zheng teaches the fluorenyl containing copolymer can comprise aryl amine repeating units (paragraph [0084]). Zheng teaches the aryl amine groups can be substituted and does not limit the type of aryl amine repeating unit that can be used (paragraph [0084]). Zheng teaches polymers composed of only repeating units comprised of applicant's formula (1) (compound 190) and applicant's formula (1) and (13) (compound 279).

55. Oguma does not specifically teach where  and  comprises substituents.

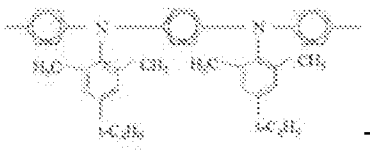
56. Noguchi teaches a polymer for a light emitting device, where the polymer can comprises a repeating unit that meets the following formula,  , where R^{33} can be a substituted aryl group (paragraph [0044]). Noguchi specifically teaches



(which is the same as applicant's formula (17)), as a repeating unit the meets the aforementioned formula (paragraphs [0069]).

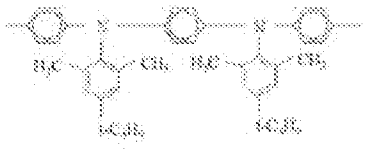
57. It would have been obvious to one of ordinary skill at the time the invention was made to substitute the aryl amine repeating units of Zheng for the aryl amine groups of

Noguchi, and



The substitution would have been one known aryl amine repeating unit for another aryl amine repeating unit and would lead to the predictable results of using

and



as aryl amine repeating units in a fluorenyl containing copolymer. Furthermore, it would have been obvious to one of ordinary skill in the art to mixture two polymers, one comprising only applicant's formula (16) and a copolymer of applicant's formula (16) and (17). Zheng teaches polymer comprising only containing the fluorenyl repeating unit and given Zheng teaches of the different alkyl groups that can be found on the bridge-head carbon, applicant's formula (16) would have been obvious, and given Zheng's and Noguchi's showing of copolymers of the fluorenyl repeating unit with applicant's formula (17) the other copolymer would have been

obvious as well. Since Zheng teaches these polymers can be mixed together the applicant's solution in claim 87 would have been obvious to one of ordinary skill in the art.

58. Claims 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. (US 2004/0131880) (hereafter “Zheng”) as applied to claims 1, 3-13, 15-23, 25, 27-35, 37-40, 45, 71-75, 77-81, 83, 86, 88, 91-98, 100, 101, and 105 above, and further in view of Roberts et al. (US 2004/0062930) (hereafter "Roberts").

59. Regarding claims 48-50, Zheng teaches the polymers can be end capped (paragraph [0256]).

60. Zheng does not teach where the polymer is end capped with a condensed ring or a substituted aryl group.

61. Roberts teaches that adding a stable condensed polycyclic aryl group can further enhance electron transport character, introduce hole transport character, enhance or modify the band gap and/or electroluminescent character of the polymer (paragraph [0064]). Roberts teaches a variety of different condensed polycyclic aryl groups and substituted aryl groups that can be used as an end cap in a polymer (paragraph [0074]).

62. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the polymers of Zheng so the ends of the polymers were capped with one of the end caps taught by Roberts. The motivation would have been to further enhance electron transport character, introduce hole transport character, enhance or modify the band gap and/or electroluminescent character of the polymer.

63. Claims 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (US 2003/0165713) (hereafter “Oguma") in view of Chen et al. (US 2003/0143422) (hereafter “Chen”)) as applied to claims 1, 4-8, 23, 25, 27-32, 36, 39, 45, 71, 80, 81, 83, 84, 91-98, and 100-109 above, and further in view of Roberts et al. (US 2004/0062930) (hereafter "Roberts").

64. Regarding claims 48-50, Oguma in view of Chen does not teach where the polymer is end capped with a condensed ring or a substituted aryl group.

65. Roberts teaches that adding a stable condensed polycyclic aryl group can further enhance electron transport character, introduce hole transport character, enhance or modify the band gap and/or electroluminescent character of the polymer (paragraph [0064]). Roberts teaches a variety of different condensed polycyclic aryl groups and substituted aryl groups that can be used as an end cap in a polymer (paragraph [0074]).

66. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify polymers of Oguma in view of Chen so the end caps where one of the end caps taught by Roberts. The motivation would have been to further enhance electron transport character, introduce hole transport character, enhance or modify the band gap and/or electroluminescent character of the polymer.

67. Claims 48-50 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (US 2003/0165713) (hereafter “Oguma") in view of Zheng et al. (US 2004/0131880) (hereafter “Zheng”) as applied to claims 1, 3-13, 15-23, 25, 27-33, 36,

39, 40, 71, 80, 81, 83, 84, 91-98, and 100-109 above, and further in view of Roberts et al. (US 2004/0062930) (hereafter "Roberts").

68. Regarding claims 48-50, Oguma in view of Zheng does not teach where the polymer is end capped with a condensed ring or a substituted aryl group.

69. Roberts teaches that adding a stable condensed polycyclic aryl group can further enhance electron transport character, introduce hole transport character, enhance or modify the band gap and/or electroluminescent character of the polymer (paragraph [0064]). Roberts teaches a variety of different condensed polycyclic aryl groups and substituted aryl groups that can be used as an end cap in a polymer (paragraph [0074]).

70. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify polymers of Oguma in view of Zheng so the end caps where one of the end caps taught by Roberts. The motivation would have been to further enhance electron transport character, introduce hole transport character, enhance or modify the band gap and/or electroluminescent character of the polymer.

71. Claims 82 and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. (US 2004/0131880) (hereafter “Zheng”) as applied to claims 1, 3-13, 15-23, 25, 27-35, 37-40, 45, 71-75, 77-81, 83, 86, 88, 91-98, 100, 101, and 105 above, and further in view of Becker et al. (WO 02/072714), where Spreitzer et al. (US 2004/0225056) (hereafter “Spreitzer”) is used as the English equivalent.

72. Regarding claims 82 and 85, Zheng does not teach where the solution is comprises at least two solvents and where the highest boiling point solvent occupies 40 to 90 wt% of the total solvent weight.

73. Spreitzer teaches solutions comprising organic semiconductor polymers and at least two solvents and teaches the solutions are used to make films comprising the polymers (abstract). Spreitzer specifically teaches that the two solvents used to make the solution can be anisole and o-xylene (paragraph [0121]). Spreitzer teaches the amount of each solvent is 1:1 by volume and since anisole has both a higher boiling point and density, the amount of the highest boiling point is between 40 to 90 wt% of the total solvent weight. Spreitzer teaches that when the solution using anisole and o-xylene as the two solvents are used the film formed displays better properties (paragraph [0128]).

74. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the solvent mixture of Spreitzer, 1:1 by volume mixture of anisole and o-xylene, to make the solution comprising the polymer to make films using the polymer of Zheng. The motivation would have been to increase the properties of the polymer devices by making better films.

75. Claims 82 and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (US 2003/0165713) (hereafter “Oguma") in view of Chen et al. (US 2003/0143422) (hereafter “Chen”)) as applied to claims 1, 4-8, 23, 25, 27-32, 36, 39, 45, 71, 80, 81, 83, 84, 91-98, and 100-109 above, and further in view of Becker et al. (WO

02/072714), where Spreitzer et al. (US 2004/0225056) (hereafter “Spreitzer”) is used as the English equivalent

76. Regarding claims 82 and 85, Oguma in view of Chen does not teach where the solution is comprises at least two solvents and where the highest boiling point solvent occupies 40 to 90 wt% of the total solvent weight.

77. Spreitzer teaches solutions comprising organic semiconductor polymers and at least two solvents and teaches the solutions are used to make films comprising the polymers (abstract). Spreitzer specifically teaches that the two solvents used to make the solution can be anisole and o-xylene (paragraph [0121]). Spreitzer teaches the amount of each solvent is 1:1 by volume and since anisole has both a higher boiling point and density, the amount of the highest boiling point is between 40 to 90 wt% of the total solvent weight. Spreitzer teaches that when the solution using anisole and o-xylene as the two solvents are used the film formed displays better properties (paragraph [0128]).

78. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the solvent mixture of Spreitzer, 1:1 by volume mixture of anisole and o-xylene, to make the solution comprising the polymer to make films using the polymer of Oguma in view of Chen. The motivation would have been to increase the properties of the polymer devices by making better films.

79. Claims 82 and 85 are rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (US 2003/0165713) (hereafter “Oguma") in view of Zheng et al. (US

2004/0131880) (hereafter “Zheng”) as applied to claims 1, 3-13, 15-23, 25, 27-33, 36, 39, 40, 71, 80, 81, 83, 84, 91-98, and 100-109 above, and further in view of Becker et al. (WO 02/072714), where Spreitzer et al. (US 2004/0225056) (hereafter “Spreitzer”) is used as the English equivalent.

80. Regarding claims 82 and 85, Oguma in view of Zheng does not teach where the solution is comprises at least two solvents and where the highest boiling point solvent occupies 40 to 90 wt% of the total solvent weight.

81. Spreitzer teaches solutions comprising organic semiconductor polymers and at least two solvents and teaches the solutions are used to make films comprising the polymers (abstract). Spreitzer specifically teaches that the two solvents used to make the solution can be anisole and o-xylene (paragraph [0121]). Spreitzer teaches the amount of each solvent is 1:1 by volume and since anisole has both a higher boiling point and density, the amount of the highest boiling point is between 40 to 90 wt% of the total solvent weight. Spreitzer teaches that when the solution using anisole and o-xylene as the two solvents are used the film formed displays better properties (paragraph [0128]).

82. It would have been obvious to one of ordinary skill in the art at the time the invention was made to use the solvent mixture of Spreitzer, 1:1 by volume mixture of anisole and o-xylene, to make the solution comprising the polymer to make films using the polymer of Oguma in view of Chen. The motivation would have been to increase the properties of the polymer devices by making better films.

83. Claim 88 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. (US 2004/0131880) (hereafter “Zheng”) as applied to claims 1, 3-13, 15-23, 25, 27-35, 37-40, 45, 71-75, 77-81, 83, 86, 88, 91-98, 100, 101, and 105 above, and further in view of Auslander et al. (US 2002/0195586) (hereafter “Auslander”).

84. Regarding claim 88, Zheng does not teach the viscosity of the solution.

85. Auslander teaches a solution comprising a light emitting polymer, wherein the viscosity at 25℃ is 1 to 25 mPa·s (paragraph [0046]) to provide an solution that can be used effectively for inkjet printing (paragraph [0045]). It is known to one of ordinary skill in the art that 1 cP is equal to 1 mPa·s.

86. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the solution, of Zheng, wherein the viscosity at 25℃ is 1 to 25 mPa·s. The motivation would have been to produce a solution that can be used effectively for inkjet printing.

87. Claim 88 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (US 2003/0165713) (hereafter “Oguma") in view of Chen et al. (US 2003/0143422) (hereafter “Chen”)) as applied to claims 1, 4-8, 23, 25, 27-32, 36, 39, 45, 71, 80, 81, 83, 84, 91-98, and 100-109 above, and further in view of Auslander et al. (US 2002/0195586) (hereafter “Auslander”).

88. Regarding claim 88, Oguma in view of Chen does not teach the viscosity of the solution.

89. Auslander teaches a solution comprising a light emitting polymer, wherein the viscosity at 25℃ is 1 to 25 mPa·s (paragraph [0046]) to provide an solution that can be used effectively for inkjet printing (paragraph [0045]). It is known to one of ordinary skill in the art that 1 cP is equal to 1 mPa·s.

90. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the solution, of Oguma in view of Chen, wherein the viscosity at 25℃ is 1 to 25 mPa·s. The motivation would have been to produce a solution that can be used effectively for inkjet printing.

91. Claim 88 is are rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (US 2003/0165713) (hereafter “Oguma") in view of Zheng et al. (US 2004/0131880) (hereafter “Zheng”) as applied to claims 1, 3-13, 15-23, 25, 27-33, 36, 39, 40, 71, 80, 81, 83, 84, 91-98, and 100-109 above, and further in view of Auslander et al. (US 2002/0195586) (hereafter “Auslander”).

92. Regarding claim 88, Oguma in view of Zheng does not teach the viscosity of the solution.

93. Auslander teaches a solution comprising a light emitting polymer, wherein the viscosity at 25℃ is 1 to 25 mPa·s (paragraph [0046]) to provide an solution that can be used effectively for inkjet printing (paragraph [0045]). It is known to one of ordinary skill in the art that 1 cP is equal to 1 mPa·s.

94. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the solution, of Oguma in view of Zheng, wherein the

viscosity at 25℃ is 1 to 25 mPa·s. The motivation would have been to produce a solution that can be used effectively for inkjet printing.

95. Claim 89 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. (US 2004/0131880) (hereafter “Zheng”) as applied to claims 1, 3-13, 15-23, 25, 27-35, 37-40, 45, 71-75, 77-81, 83, 86, 88, 91-98, 100, 101, and 105 above, and further in view of Li (US 6,372,154) (hereafter “Li”).

96. Regarding claim 89, Zheng does not teach where the solution further comprises an additive to control viscosity or surface tension.

97. Li teaches a solution comprising a light emitting material that is used for inkjet printing to make organic light emitting device (abstract). Li teaches that one can control the viscosity and surface tension of the solution by adding additives to the solution (column 2 lines 15-34). Li teaches that adding the additives can improve the ink/substrate contact angle (column 2 lines 30-34).

98. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the viscosity and/or surface tension of the solution, of Zheng, by adding additives to the solution. The motivation would have been to produce a solution that can be used effectively for inkjet printing.

99. Claim 89 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (US 2003/0165713) (hereafter “Oguma") in view of Chen et al. (US 2003/0143422)

(hereafter “Chen”)) as applied to claims 1, 4-8, 23, 25, 27-32, 36, 39, 45, 71, 80, 81, 83, 84, 91-98, and 100-109 above, and further in view of Li (US 6,372,154) (hereafter “Li”).

100. Regarding claim 89, Oguma in view of Chen does not teach where the solution further comprises an additive to control viscosity or surface tension.

101. Li teaches a solution comprising a light emitting material that is used for inkjet printing to make organic light emitting device (abstract). Li teaches that one can control the viscosity and surface tension of the solution by adding additives to the solution (column 2 lines 15-34). Li teaches that adding the additives can improve the ink/substrate contact angle (column 2 lines 30-34).

102. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the viscosity and/or surface tension of the solution, of Oguma in view of Chen, by adding additives to the solution. The motivation would have been to produce a solution that can be used effectively for inkjet printing.

103. Claim 89 is are rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (US 2003/0165713) (hereafter “Oguma") in view of Zheng et al. (US 2004/0131880) (hereafter “Zheng”) as applied to claims 1, 3-13, 15-23, 25, 27-33, 36, 39, 40, 71, 80, 81, 83, 84, 91-98, and 100-109 above, and further in view of Li (US 6,372,154) (hereafter “Li”).

104. Regarding claim 89, Oguma in view of Zheng does not teach where the solution further comprises an additive to control viscosity or surface tension.

105. Li teaches a solution comprising a light emitting material that is used for inkjet printing to make organic light emitting device (abstract). Li teaches that one can control the viscosity and surface tension of the solution by adding additives to the solution (column 2 lines 15-34). Li teaches that adding the additives can improve the ink/substrate contact angle (column 2 lines 30-34).

106. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the viscosity and/or surface tension of the solution, of Oguma in view of Zheng, by adding additives to the solution. The motivation would have been to produce a solution that can be used effectively for inkjet printing.

107. Claim 90 is rejected under 35 U.S.C. 103(a) as being unpatentable over Zheng et al. (US 2004/0131880) (hereafter "Zheng") as applied to claims 1, 3-13, 15-23, 25, 27-35, 37-40, 45, 71-75, 77-81, 83, 86, 88, 91-98, 100, 101, and 105 above, and further in view of Amano et al. (WO 03/048268), where Onikubo et al. (US 2004/0151944) (hereafter "Onikubo") is used as the English equivalent.

108. Regarding claim 90, Zheng does not teach where the solution further comprises an antioxidant.

109. Onikubo teaches that a solution comprising a material to make a film for a light emitting device can comprises additives to improves the film forming properties of the film and teaches antioxidants are one of the additives that can be added to the solution to make the film (paragraph [0050]).

110. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the solution, of Zheng, by adding an antioxidant to the solution. The motivation would have been to improve the film forming properties of solution.

111. Claim 90 is rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (US 2003/0165713) (hereafter “Oguma") in view of Chen et al. (US 2003/0143422) (hereafter “Chen”)) as applied to claims 1, 4-8, 23, 25, 27-32, 36, 39, 45, 71, 80, 81, 83, 84, 91-98, and 100-109 above, and further in view of Amano et al. (WO 03/048268), where Onikubo et al. (US 2004/0151944) (hereafter “Onikubo”) is used as the English equivalent.

112. Regarding claim 90, Oguma in view of Chen does not teach where the solution further comprises an antioxidant.

113. Onikubo teaches that a solution comprising a material to make a film for a light emitting device can comprises additives to improves the film forming properties of the film and teaches antioxidants are one of the additives that can be added to the solution to make the film (paragraph [0050])..

114. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the solution, of Oguma in view of Chen, by adding an antioxidant to the solution. The motivation would have been to improve the film forming properties of solution.

115. Claim 90 is are rejected under 35 U.S.C. 103(a) as being unpatentable over Oguma et al. (US 2003/0165713) (hereafter “Oguma") in view of of Zheng et al. (US 2004/0131880) (hereafter “Zheng”) as applied to claims 1, 3-13, 15-23, 25, 27-33, 36, 39, 40, 71, 80, 81, 83, 84, 91-98, and 100-109 above, and further in view of Amano et al. (WO 03/048268), where Onikubo et al. (US 2004/0151944) (hereafter “Onikubo”) is used as the English equivalent.

116. Regarding claim 90, Oguma in view of Zheng does not teach where the solution further comprises an antioxidant.

117. Onikubo teaches that a solution comprising a material to make a film for a light emitting device can comprises additives to improves the film forming properties of the film and teaches antioxidants are one of the additives that can be added to the solution to make the film (paragraph [0050]).

118. It would have been obvious to one of ordinary skill in the art at the time the invention was made to modify the solution, of Oguma in view of Zheng, by adding an antioxidant to the solution. The motivation would have been to improve the film forming properties of solution.

Conclusion

119. Any inquiry concerning this communication or earlier communications from the examiner should be directed to ANDREW K. BOHATY whose telephone number is (571)270-1148. The examiner can normally be reached on Monday through Thursday 8:00 am to 5:30 pm EST and every other Friday from 8:00 am to 4:30 pm EST.

120. If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Jennifer Chriss can be reached on (571)272-7783. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

121. Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Jennifer A Chriss/
Supervisory Patent Examiner, Art Unit 1786

/A. K. B./
Andrew K. Bohaty
Patent Examiner, Art Unit 1786